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Smart Blind Stick for Blind People

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ABSTRACT: This document gives a brief information about creating a project on Smart Blind Stick. A Blind stick helps blind people to identify obstacles, without blind stick it is difficult for them to complete their day to day activities , they have to depend on their guardiance and other people. The smart blind stick can help these people to complete their day to day activities in easy manner, they don't need to depend on anyone. This stick consists of a ultrasonic sensor which detects the nearby obstacle and sends signal to arduino uno , the arduino receives the signals sends output through speaker informing user about the obstacle and its distance, and will also inform user about their direction through GPS.

KEYWORDS: Arduino Uno, Ultrasonic sensors, Arduino IDE

I. INTRODUCTION

A traditional blind stick cannot fulfill the requirements of modern world . The main problem faced by the blind people is mobility. The inability of them to participate in social event. To complete daily activities generally a cane or a trained dog is used but these options are unreliable.

Population of blind people in the world, with low vision, visually impaired per million

Number of people (in thousands) blind, with low vision, visually impaired per million
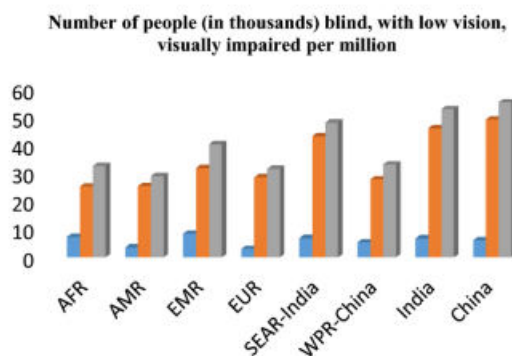
With the help of advanced technology hardware and software components can be used to create a smart blind stick. The smart blind stick helps to make the visually impaired people lives a little easy by guiding them to their destination and also by protecting them from colliding to any obstacle. The aim of this project is to help the blind people from hurting themselves and navigating them to their destination, which will make them independent to some extent.

This project will consists of arduino uno which is a open source software that converts the input signals into a particular output, this component detects both analog and digital signals. The main component used is ATMega328 microcontroller, the entire arduino board is based on this single chip microcontroller which is written in C language , the entire programming of arduino uno will be done in a software named Arduino IDE. Other than these devices an two ultrasonic sensor will help to detect the obstacles in front of user and also below it(example stairs). It will also consists of a speaker that will be instructing user about the obstacles through voice commands. A button will be embedded in this stick, in case any panic situation occurs the user can press this button and a message will be sent on the guardians phone informing the user's location. Moving to GPS navigation the user will be telling the destination to be reached which will be recognised by voice recognisation module and navigation instruction will be given to user through voice only which will lead to the desired destination.

II. LITERATURE SURVEY

Benjamin C5 Laser Cane was the first blind stick that gained world wide popularity. The Mowat sensors use ultrasonic waves for obstacle. The ETA popularly known as Sonic Path finder user three receiving and two sending transducers for obstacle detection . Other than this the Navbelt devices use a wide view of approximately 120 degress.

1) Voice Recognition and Voice Navigation fpr Blind using GPS by Mansha Bansode, Shivani Jadhav, Anisha Kashyap.
2) Smart Blind Stick using Voice Module from IRJET
3) Blind Guide Stick using GPS and GSM module by IJCRT.
4) "Smart Blind Stick for Visually Impaired People" by P. S. Ranjitha, K. S. S. Kumar, and Dr. K. S. S. Nithyanandam - This paper discusses the design and implementation of a smart blind stick using ultrasonic sensors and microcontrollers to aid visually impaired individuals in navigating their surroundings.
5) "Development of Smart Stick for Visually Impaired People" by M. S. Hossain, M. M. Hasan, and M. A. Hossain - This paper presents the development of a smart stick with obstacle detection and GPS navigation features to assist visually impaired individuals in mobility and navigation..
6) "Design and Implementation of Smart Cane for Visually Impaired People" by A. Adhikari, A. K. Singh, and S. K. Singh - This paper describes the design and implementation of a smart cane with obstacle detection and alerting capabilities to enhance the mobility of visually impaired individuals.

These literature reviews provides an overview of existing research and developments related to smart blind stick using Arduino, GSM, GPS and Ultrasonic sensors

III. PROPOSED SYSTEM

The proposed system for smart blind stick will consists of three ultrasonic sensor , one will be placed in front , one will be placed in right and other will placed in left ; these sensors will be connected to a ardino uno board which will be taking the input from sensors and generating output through speakers in the form of voice.
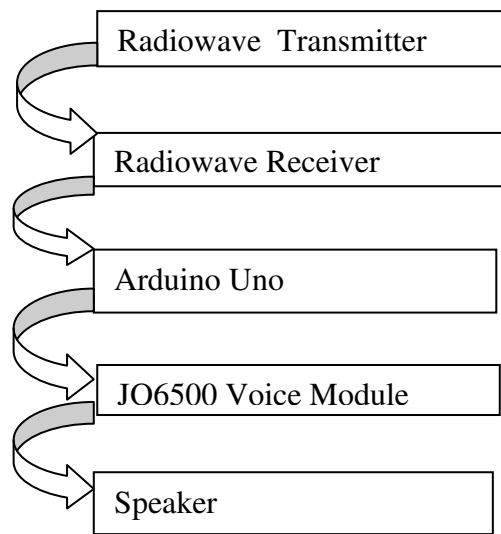Above is the basic idea about the stick's system, in this the speaker is connected to jq5600 board which will be generating the output given by ardino into mp3, when connected to the computer/laptop using usb cable it will open a MusicDownload.exe which is a chinese application in this application all the required mp3 files will uploaded
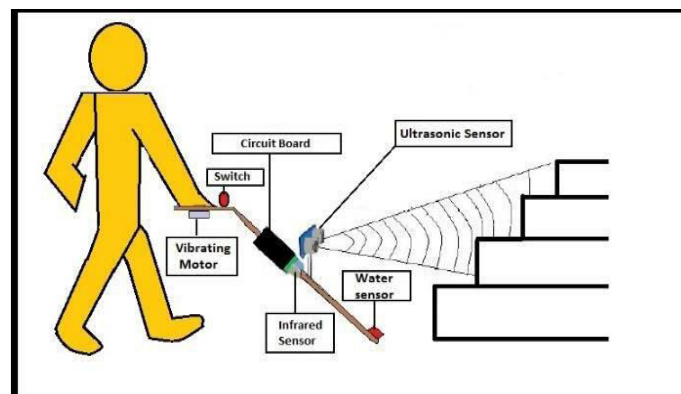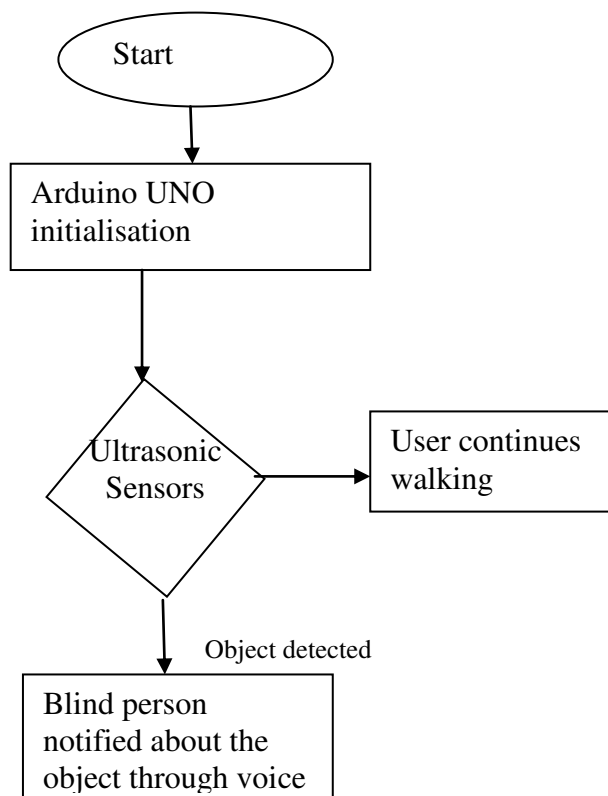

Proposed stick's use illustration

- Object Detection Process

The sensors will consists of a the Radio Frequency Transmitter which will transmit the radio waves when the system is on ,when these waves will hit any obstacle they will reflect and these reflected rays will be captured by Radio Frequency Receiver. The Radio Frequency Receiver will be sending the result to Arduino UNO , and then once the input is given to Arduino it will generate output, since Arduino can not generate voice output JQ6500 Voice Module comes into scenario , the result will be sent to the voice module which will then process the result into appropriate voice command

```
Radiowave  Transmitter

Radiowave Receiver

Arduino Uno

JO6500 Voice Module

Speaker
```

- Flow Chart

```
        Start
          |
          v
   Arduino UNO
   initialisation
          |
          v
   Ultrasonic  ------>  User continues
   Sensors              walking
          |
          | Object detected
          v
   Blind person
   notified about the
   object through voice
```

Basic description of flow chart is that , first the Arduino uno is initialised i.e. the stick is started, when the obstacle is detected the voice alert is given if no obstacle is detected the user continues to walk

The time taken by the wave from sensors to obstacle and back to the sensors can be calculated by Arduino using the following formula:

$$Distance = \frac{\frac{Duration}{2}}{29.1}$$

- Basic Block Diagram of Blind stick (For Obstacle detection and GPS module)

The main hardware will be the arduino Uno board to which all the components will be connected. Three sensors (one at centre, one at right, one at left) will be connected to board when they detect objects signal will be sent to arduino, arduino will generate the output in analog or digital waves, this output will be converted into voice signal by JQ5600 and then the voice will be emitted through speakers. To give power supply to electronic devices a power bank or 9V battery will be used. An emergency Button will be attached so in case of panic situation the blind user can contact its guardian
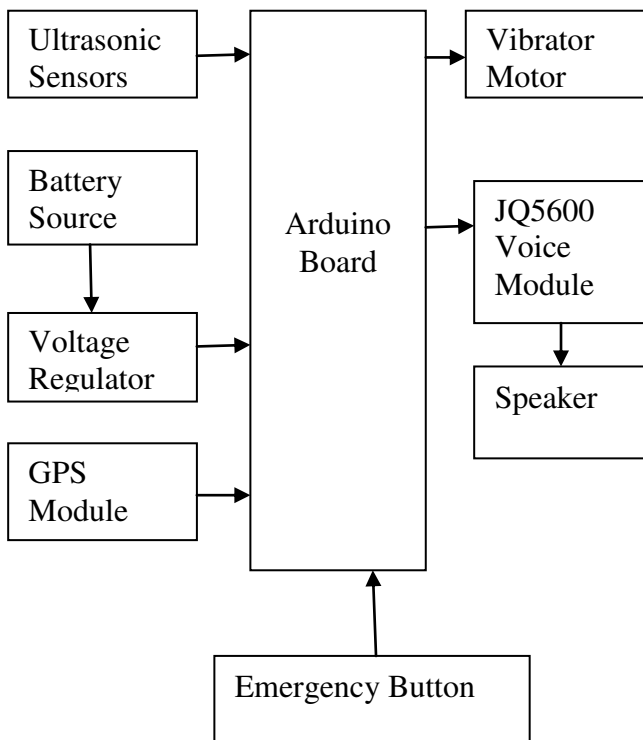
- Hardware Components used

1. Arduino Uno :- It is a open source hardware that will be generating output in the analog or digital signals by taking input with the help of sensors or other hardware.

2. Ultrasonic Sensors :- Ultrasonic sensors are devices that sense the object and their distance

3. JQ6500 Voice Module :- It is a voice module that can play typical mp3 files. Basically used to generate voice assistance

4. GPS Module :- It is a wireless chip that can trace user's location and will help in navigation assistance.

5. Speaker :- A small speaker that will be the main source for voice emmition

6. Voice Recognisation Module :- Through this module user will be giving the destination where they wish to go.

- Software Description

1. Arduino IDE :- Arduino IDE is a software required for programming of Arduino UNO.

2. Tiny GPS++ :- It is used to provide GPS functionality. It provides Arduino user position,date,time,altitude.

- Features of Blind Stick

1. Stick uses GPS technology to guide users through the path and help them reach their desired destinations
2. Alerts given to the users of obstacles
3. Easy to use
4. Portable

Future Scope

1. The Smart blind stick can be made for face detection which will help the user to even recognise people
2. A direct help from police can be made through push button.
3. Object detection can be done for future use to detect different king of object like table chair etc
4. Use of arduino nano is also possible

IV. CONCLUSION

Hence , A smart Blind stick is useful in helping blind people in various ways and making their lives easy at some extent. All over these deveices, a smart bling stick is a electronic device in which sensors will play important role in object detection

REFERENCES

1. "Smart Blind Stick for Visually Impaired People" by P. S. Ranjitha, K. S. S. Kumar, and Dr. K. S. S. Nithyanandam
2. Voice Recognition and Voice Navigation fpr Blind using GPS by Mansha Bansode, Shivani Jadhav, Anisha Kashyap.
3. Smart Blind Stick using Voice Module from IRJET

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